DEGERenergie
Tracking Systems

Assembly Instruction

DEGER**traker** 7000NT

Latest update: 04/2007

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IMPORTANT INSTRUCTIONS!!

The start-up protocol (page 23) should be filled out on initial operation and faxed to the company DEGERenergie within 4 weeks of start-up. The entitlement to warranty claims for material defects will be only extended from the statutory two-year period warranty to three years if this protocol is submitted within the specified timeframe.

A fault report (page 24) must be submitted in order to process complaints. Complaints cannot be processed if fault reports have not been filled out correctly!!

Introduction

Congratulation for aquiring a DEGERtraker 7000NT. You decided for a high quality dual-axis solar tracking system which can be used for all current photovoltaic solar modules.

Maximum solar yield...

can be achieved with the DEGERtraker tracking system. By using the DEGERtraker tracking system, you are truly acknowledging the signs of our times: you are not only protecting our environment and nature but you are increasing your yield and thus achieving amortisation sooner.

Maintenance-free. Long-lived. Recyclable.

The systems designed to these exacting parameters are mass-produced in an ISO 9001-certified factory under environmentally sound conditions. DEGERtraker systems are truly 99.9% recyclable. Compared with rigid systems, the amount of electronic scrap after useful life is 40% lower!

Quick installation.

Pre-assembled components and detailed instructions allow an installation within about two hours (after the mast has been erected).

A technology to rely on.

The fact that the patent-protected control system and the utility model-protected mechanical system were awarded the inventor's prize of the federal state of Baden-Württemberg in South-Germany in 2000 shows that the DEGERtraker meets the demands of both experts and investors. The proven static design of the DEGERtraker is based on DIN 1055-4 (8.86) and DIN 1056 (10.84) for installation up to 8m.

Scope of delivery.

Complete dual-axis tracking system, mast, aluminium solar module carrier system to fit the respective module type, DEGERconecter control electronics with energy converter for extremely economical operation, foundation plan, construction plan.

1. Security advices

The installed DEGERtraker tracking system has to be protected against trepassing in its hole sphere of action by adapted measures, for example by erecting a fence.

While assemblage of the DEGERtraker 7000NT or parts of the system and while the system is put into operation some risks of injury exist caused by moveable parts of the tracking system. To protect injuries caused by eventually existing burrs or sharp angles we imperatively recommend to wear gloves when mounting the steel parts of the system.

In case of checks or changes at the DEGERtraker 7000NT all parts of the system have to be free of potential. Zero-potential and mechanical protection have to be proven and guaranteed due to the “Allgemeinen Regeln zur Unfallverhütung”. When voltage supply is indispensable for checking the system injuries of persons have to be ruled out by adapted actions.

Lightning protection and earthing have to be achieved due to DIN VDE 0185 or 0100 as with all photovoltaic systems.

The hole sphere of action has to be free of any objects.

The DEGERtraker 7000NT can be moved manually by activating with 24VDC to the clamps 16-17 (Elevation-axle) or to the clamps 18-19 (East-West-axle) for example by using a pushbutton. Therefore please pay attention to chapter 3.2 and 3.3 of this assembly instruction.

The development of the DEGERtraker 7000NT is based on the DIN 1055-4. With application of the windguard the system resits to higher demands than the values that are given in the norm.

In case of accumulation of snow on the module surface with more than 35kg/m² it is necessary to broach the module surface. It is possible to do this by activating manually the elevation-drive as described above.

Intended Use

The DEGERtraker 7000NT is designed and dimensioned to be applied with Standard-Photovoltaic modules and is therefore not adapted to be applied with Concentrator-modules, mirrors, solar thermal collectors etc. The denoted maximum modulespace of 60m² must not be exceeded in any case and has to be reduced according to regional conditions and regulations if necessary. As soon as the modules are mounted an operating wind guard has to be assembled or the modulespace has to stay in the horizontal position.

Permissible ambient temperature:	-20°C to +55°C	
Sound level :	Distance 10m:	40 dB(A)
	Distance 20m:	no difference to the sound level of the surrounding measurable
	Reference value:	
	40 dB(A) corresponds to:	- tweet of a bird - usual background sound level in a house

2. Assembly

2.1 Short assembly instruction

1st step:

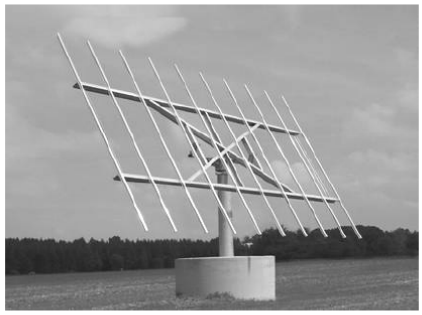
Assembly foundation and mast

2nd step:

Assembly integrated motor east -west

3rd step:

Assembly base frame

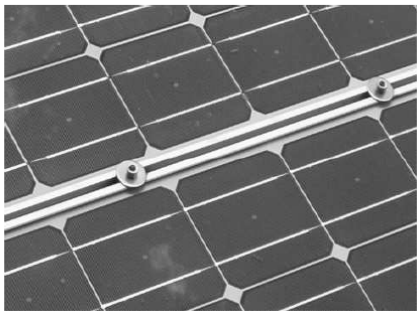


4th step:

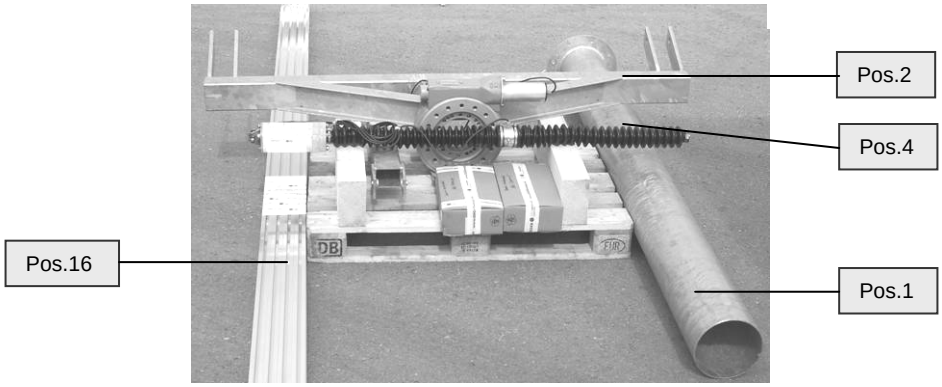
Assembly Elevation motor

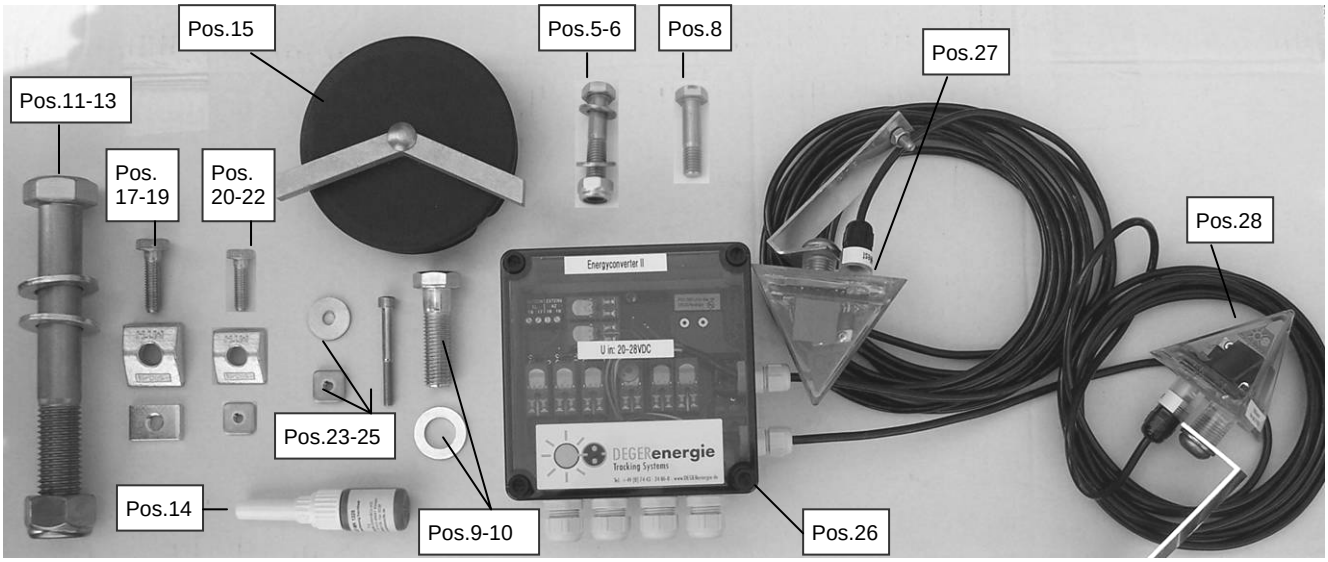
5th step:

Assembly modules and control unit



2.2 Scope of delivery





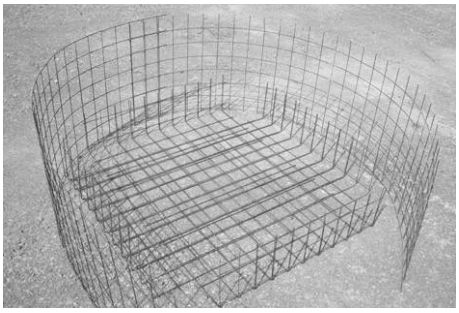
DEGERtraker 7000NT							
Pos.	**Appellation**	**Application**	**Amount**	**Pos.**	**Appellation**	**Application**	**Amount**
1	Mast		1	**18**	Sliding nut M10, 30x20x6	Alu/Base frame	24-44*
2	Rotating head		1	**19**	Bolt M10x35	Alu/Base frame	24-44*
3	Base frame (10,60 x 2,60m)		1	**20**	Clamp MTH M8	Solar module	24-44*
4	EL-motor		1	**21**	Sliding nut M8	Solar module	24-44*
5	Bolt M14x70	EL-motor	1	**22**	Bolt M8x30	Solar module	24-44*
6	Nut M14	EL-motor	1	**23**	Clamp plate 25x6,4x2	Solar module	32-154*
8	Bolt M12x50	EL-motor	2	**24**	Bolt M6	Solar module	32-154*
9	Bolt M16x45	Flange	18	**25**	Sliding nut M6, 18x18x5	Solar module	32-154*
10	Washer M16	Flange	18				
11	Bolt M24x180	Base frame	2		**Control unit energy converter V**		
12	Nut M24	Base frame	2	**26**	casing with plate		1
13	Washer M24	Base frame	4	**27**	DEGERconecter east-west	Sensor	1
14	Tread locking fluid 5g		1	**28**	DEGERconecter elevation	Sensor	1
15	Cover for mast with boomerang	Mast	1				
16	Aluminium profiles		12-22*		**Optional** (without picture)		
17	Clamp MTH M10	Alu/Base frame	24-44*	**29**	CCB	Control unit	1
				30	Power pack 24V	Control unit	1

* depends on size and amount of modules

2.3 Assembly Foundation and Mast

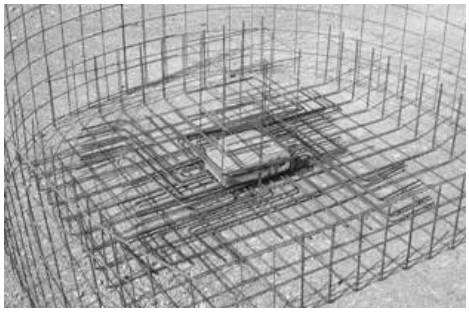
1st step:

- build soil
- build in ductwork (not in the picture)
- arrange reinforcement mat to support the bracing (proposal to create a round bracing)
  (dimensions of the foundation see page 8 and 9)
- build in reinforcement (Pos. [2] plan of reinforcement).
  use reinforcing bar spacer



2nd step:

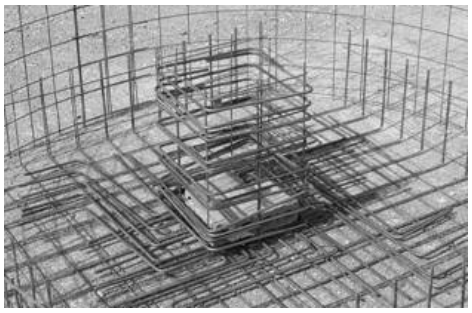
- build in staff steel (Pos. (2) plan of reinforcement) (also see step 4)
- build in bearing for mast (high ca. 10 cm) in central position
- build in reinforcement (Pos. [1] plan of reinforcement) in central position



ATTENTION: ductwork has to be within the mast

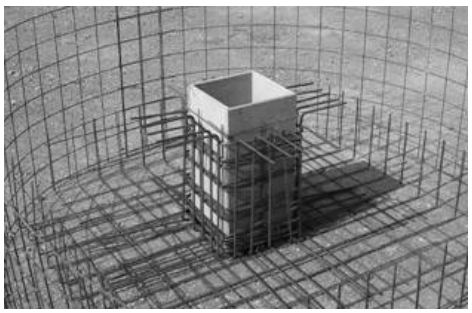
3rd step:

- build in staff steel (Pos. (1) plan of reinforcement)



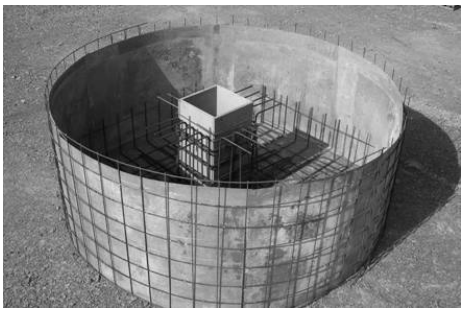
4th step:

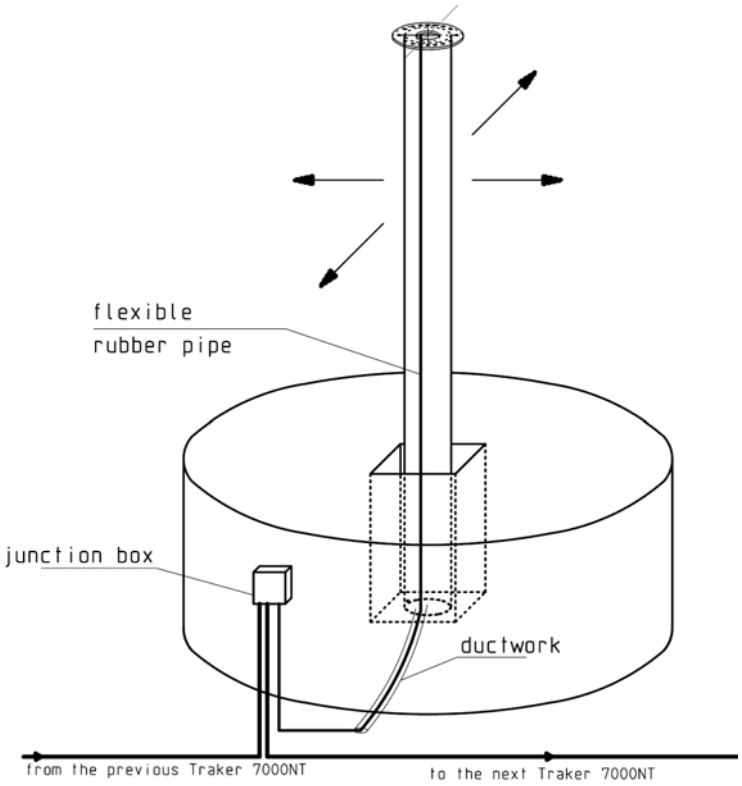
- build in bracing for quiver (40 x 40cm)
- errect and fix staff steel (Pos. (2) plan of reinforcement)



5th step:

- Build in bracing for the foundation (suggestion: galvanized sheet metal)
- bracing for the foundation has to be fixed in that way the force of the concrete can be accepted. (suggestion: additional protection by a tension belt)
- filling and compaction of the foundation with concrete (without quiver)





6st step:

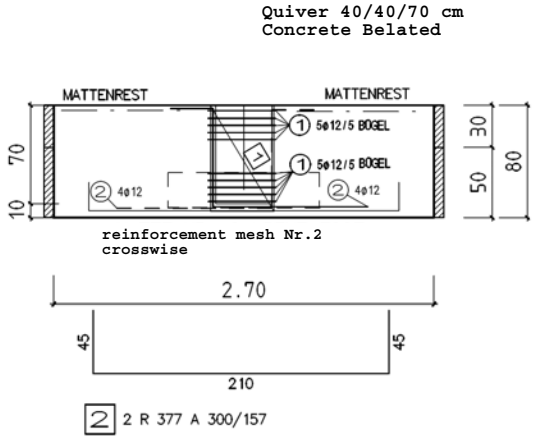
- point mast into the quiver
  The position of the drills in the flange don`t have to be attended
- adjust the mast vertical
- fix the mast
- filling and compaction of the quiver with concrete

Cable conduit

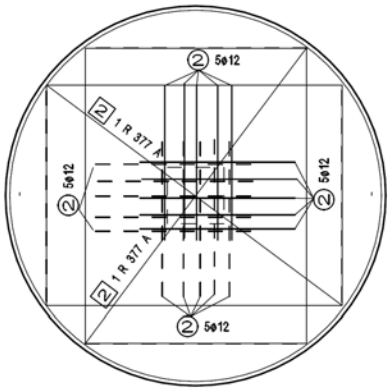
We recommend to place a junction box at the side of the foundation. (see drawing beside) For the lines between junction box an rotation head use flexible rubber pipes.

Reinforcement of foundation
Ø 2.70m; height: 0.80m

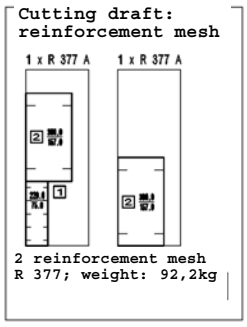
SECTION:



TOP VIEW:

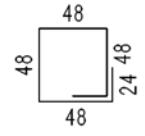


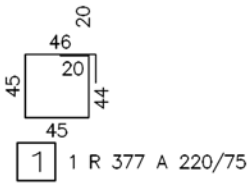
Biegeliste	STAFF STEEL 500/550				Datum: 23.07.2006
Position	Anzahl	Durchmesser	Länge [m]	Ges.gew.	Biegeform
1	10	12	2.40 Winkelhaken A: 24.0 Winkelhaken E: 24.0	21.312	48 48 E
2	20	12	2.10	37.296	30 70 110
Summe Gesamtgewicht:			58.608		

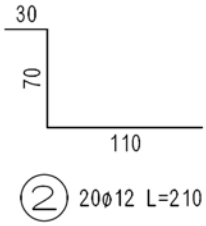


For DEGERtraker 7000NT
Total Length of the mast 3.30m

Concrete C20/25, XC2
Cover of concrete 4cm







ING.BÜRO BAUSTATIK-TRAGWERKSPLANUNG
DIPL.-ING. WOLFGANG WANNENMACHER
ARNISTAL 37, 72160 HORB-DETTINGEN
TEL:07482-913453, FAX:07482-913454,
AUFGESTELLT: 23. JULI 2006

Dimension of foundation and mast

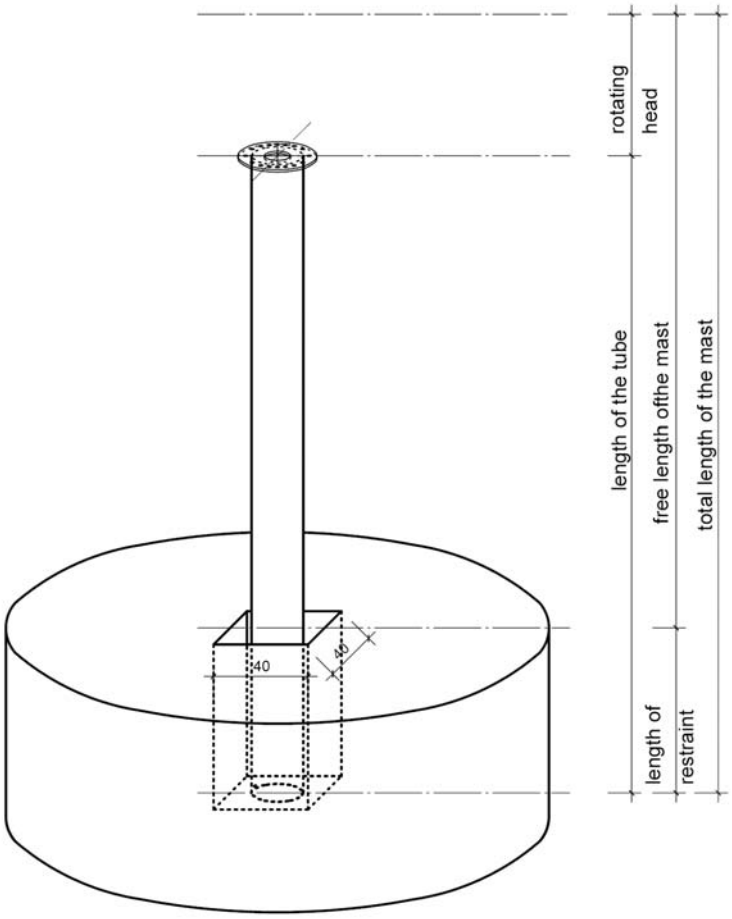
Dimensions with standard-mast:

length of the tube: 2,70m
total length of the mast: 3,30m
length of restraint: 0,70m
mast profile: 323.9 x 7.1mm

diameter of foundation: 2,70m
height of foundation: 0,80m

Deviation of standard-mast:

In case of using a mast that deviates to the standard-mast (length 3.30m) the dimensions of the foundation and of the mast listed below have to be abode like listed below.



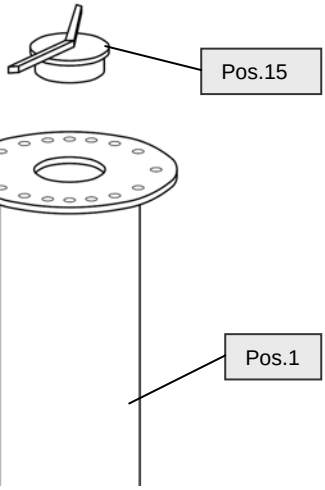
Solarmodule-space m²	total length of the mast m	free length of the mast m	length of restraint m	MAST PROFILE Ø / wall thickness mm	mast weight kg	FOUNDATION DIMENSIONS cm
60	3,3	2,6	0,7	TUBE 323.9 x 7.1	120	Ø270x80
60	4,0	3,3	0,7	TUBE 323.9 x 8.0	170	Ø280x80
60	4,5	3,8	0,7	TUBE 323.9 x 10.0	240	Ø290x80
60	5,0	4,3	0,7	TUBE 323.9 x 11.0	280	Ø300x80
60	5,5	4,8	0,7	TUBE 323.9 x 14.3	380	Ø310x80

2.4 Assembly of Integrated Motor East-West (IMO)

7th step:

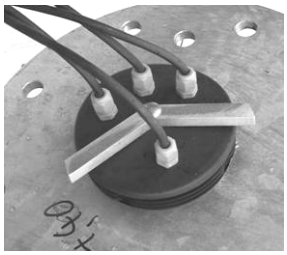
- mounting cover for mast with „boomerang“ (**Pos. 15**) on the top of the mast (drive in with a rubber mallet)

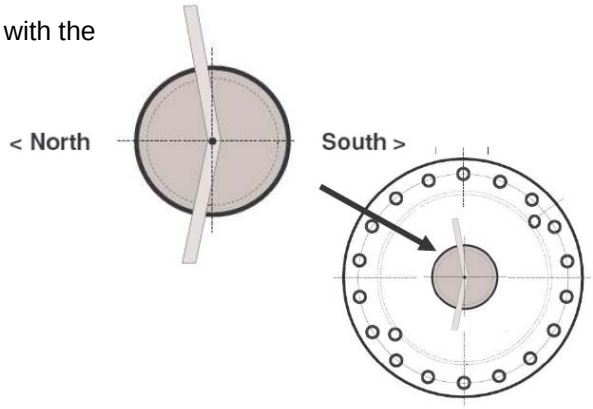
The tip of the “boomerang” must point in a southward direction (+/-3°). Use a GPS device or refer to the surveyor’s plan of the property to determine the south position. (a compass is not precise enough)



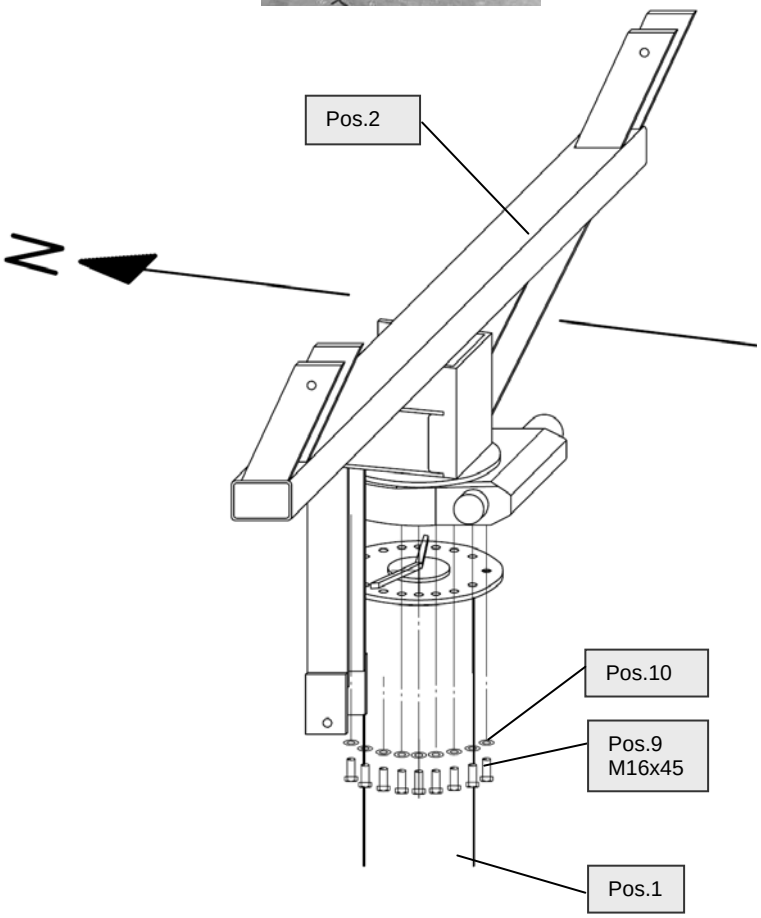
ATTENTION! Cable feed through

Use flexible rubber pipes. Insert the cable screw connections into the plastic cover in accordance with the corresponding wiring.





Attention needs not be paid to the position of the bore holes.



1st step:

- set rotating head (**Pos. 2**) onto the flange on the top of the mast.

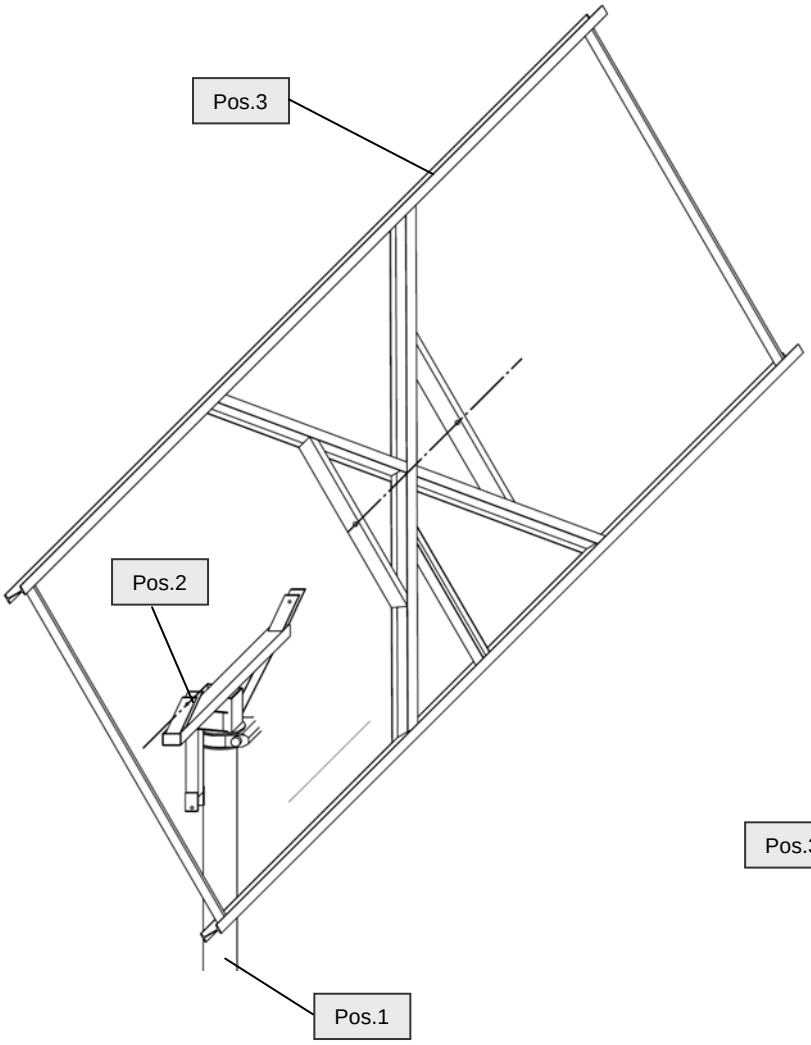
The IMO unit should roughly point south (+/-30°) while being screwed tight.

2nd step:

- screw rotating head (**Pos. 2**) with the flange (**Pos. 1**) by using bolts M 16x 45 (**Pos. 9**) and washers M 16 (**Pos. 10**).

torque 200 NM.

2.5 Assembly of the base frame



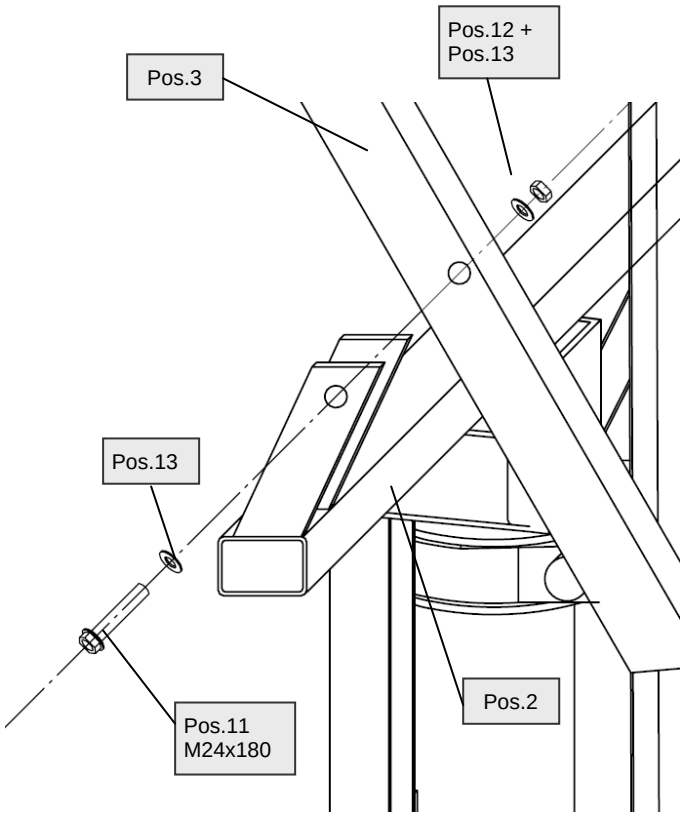
1st step:

Suspend the base frame (**Pos.3**) by using a crane in such a way that the bore holes at the tip of rotation of the base frame are at the top and the connection for the EL motor (EMO) is on the left.

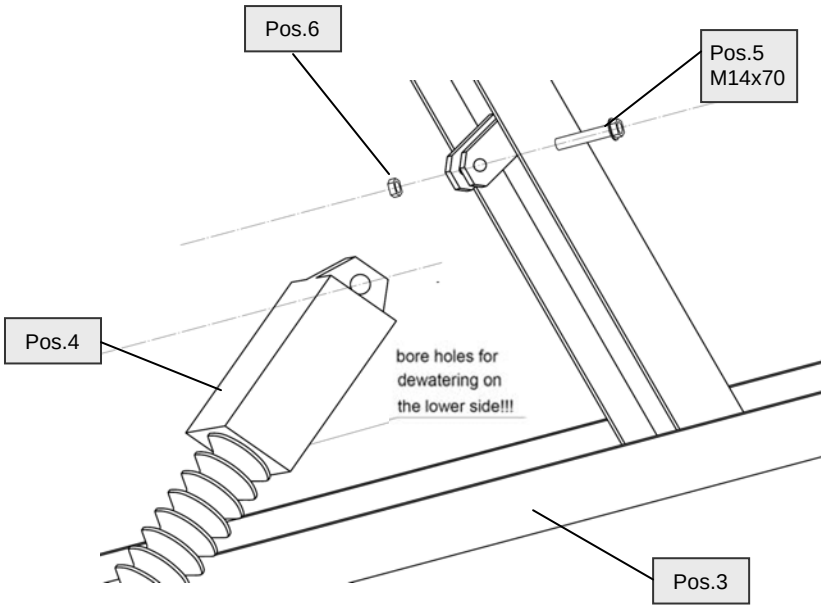
2nd step:

Built in stainless steel bolt M24x180 (**Pos.11**) with washer M24 (**Pos.13**) and nut M24 (**Pos.12**). Do not screw the stainless steel bolts too tightly, to ensure that the shackles at the rotating head are not pressed together.

Sliding bearing connectors are integrated in the point of rotation of the base frame – these should be lubricated slightly for initial assembly only.



2.6 Assembly of Elevation-Motor (EMO)



1st step:

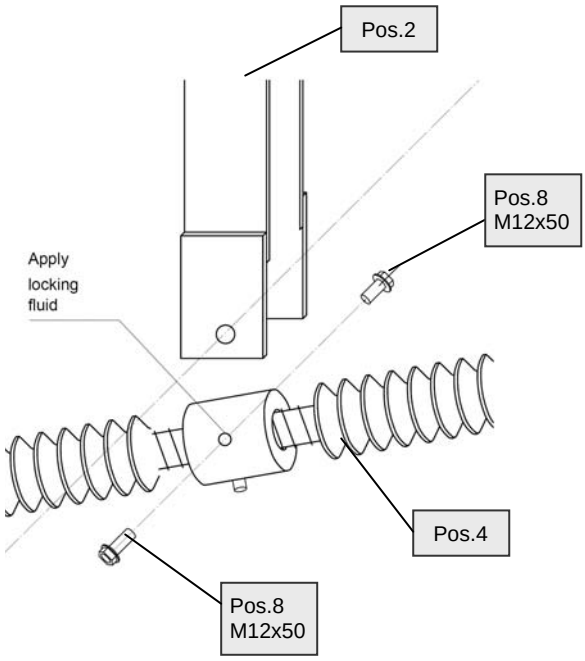
Fix Elevation motor (EMO) (**Pos. 4**) at the base frame (**Pos. 3**) by using bolt M14x70 (**Pos. 5**), nut M14 (**Pos. 6**) and washer M14 (**Pos. 7**). Attention needs to be paid to the bore holes for dewatering. They need to be on the lower side.

2nd step:

Fix Elevation motor at the rotation head (**Pos.2**) by using the spezial screws M12x50 (**Pos.8**). Therefore the enclosed thread locking fluid (**Pos. 14**) has to be used. Tighten the special screws with a **tarquet of 35 Nm**.

- Do not use any other screws except those included in the delivery (**Pos.8**)!
- Apply max. one drop of the locking fluid to the internal thread of the EMO.
- Ensure that no locking fluid enters into the sliding bearing connector!

The EMO is delivered with preseted limit switches so no set up work has to be done at all.



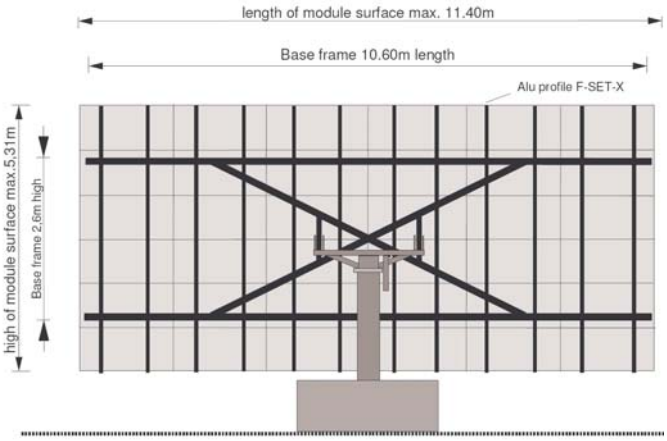
Warning!!

The enclosed BEST-MK 1325 thread locking fluid must be used!!

Checking of the elevation- and east-west-mechanics

Extend and retract the complete way of the drive, to guarantee that the mechanics moves freely, doesn't knock agaist anything and that the cables are long enoungh. Use a 12V or 24V batterie (for ex. suitable for a battery-driven drill) for the head of the drive.

2.7 Assembly of module carry system



Module arrangement:

The following dimensions have to be abode and have to be reduced according to regional conditions if necessary:

- Module surface: **max. 60m²**
- length of Module surface: **max. 11,40m**
- high of Module surface: **max. 5,30m**

The limit for the whole module surface is 60m²

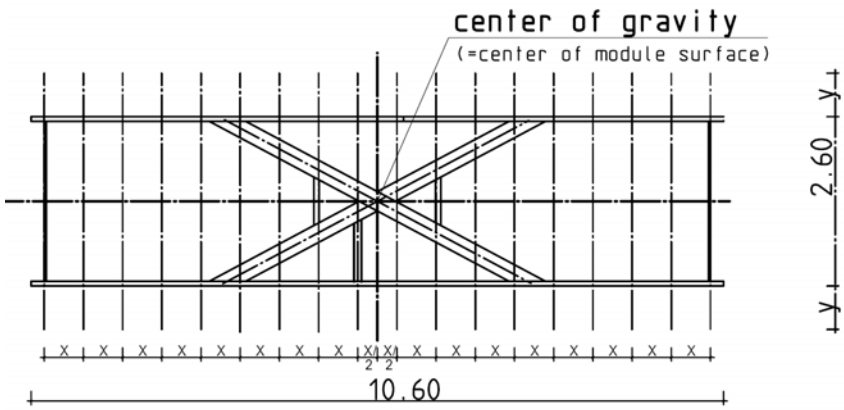
1st Step:
Arrangement of aluminium profiles:

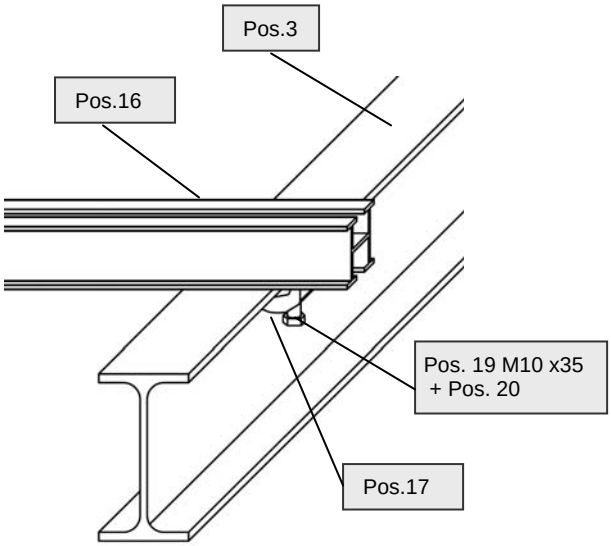
Following points have to be attended:

- in both axels modules have to be arranged symmetrically to the center of gravity
- 2 aluminium profiles for each row of modules
- attend the connecting socket on the backside of the modules

x = width of module / 2

y = (length of aluminium profile – 2.60m) / 2





2nd step:

Assemble aluminium profile (**Pos. 16**) at the base frame (**Pos. 3**) by using clamp MTH (**Pos. 17**), bolt M 10 x 35 (**Pos. 19**) and sliding nut M10 (**Pos. 18**)
torque: 35NM
The clamp MTH has to be slided inside the aluminium profile towards the base frame until the bolt contacts the base frame

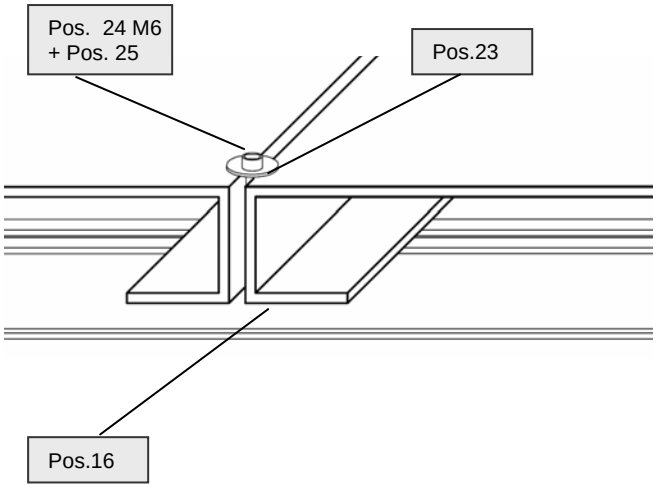
ATTENTION:

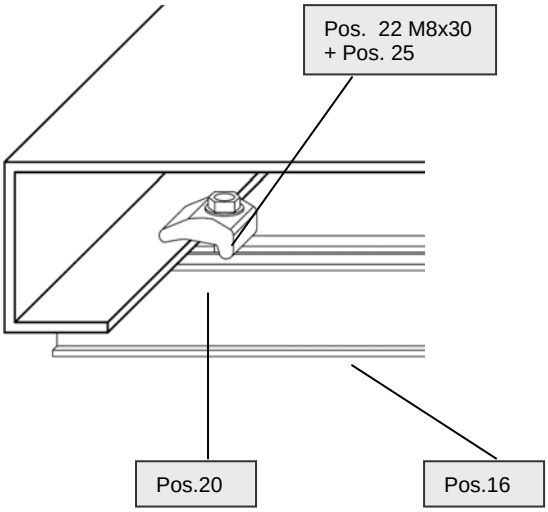
Extend and retract the complete way of the drive, to guarantee that the mechanics moves freely, doesn't knock agaist anything and that the cables are long enoungh.

2.8 Assembly of the modules

Between the modules

Assemble modules on the aluminium profiles (**Pos.16**) by using bolt M6 (**Pos. 24**), clamp plate (**Pos. 23**) and sliding nut M6 (**Pos. 25**)

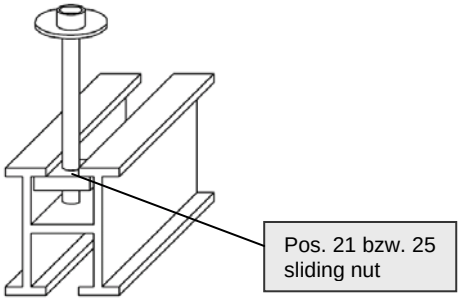




At the end of the module-surface

Assemble modules on the alumnium profiles (**Pos.16**) by using clamp MTH (**Pos. 20**), bolt M8x30 (**Pos. 22**) and sliding nut M8 (**Pos. 21**)
Torque: 18 Nm

Both the clamp MTH and the bolts will have to be assembled with a sliding nut as shown beside. The sliding nuts have to be mounted in that way the side with the sharp, not rounded angles is pressed against the Aluminium profile.



Tip:

Bring the DEGERtraker in a horizontal position - then it will be easier to install the modules

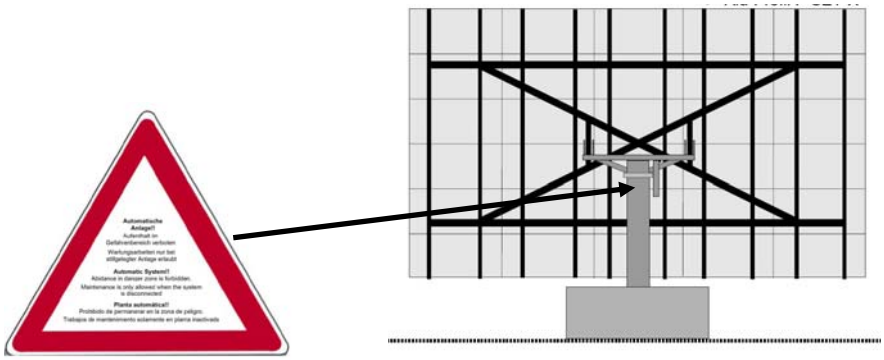
ATTENTION:

The limit for the whole module surface is 60m² and is not allowed to exceed.

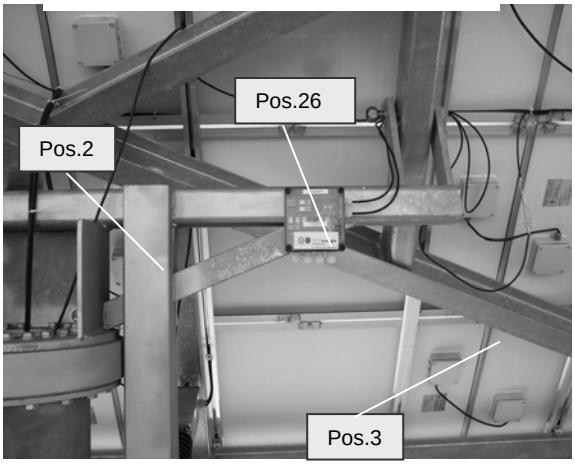
Defects resulting from a too large module surface are not covered by the warranty. As soon as the solar modules are installed you have to install a functioning wind guard or the module surface has to stay in a horizontal position.

AFFIX OF WARNING NOTICE

The delivered warning notice has to be affixed to the mast of every system well observeable.

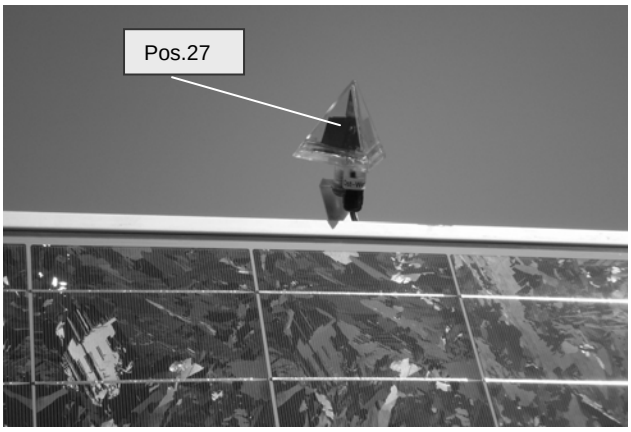


2.9 Assembly of the control unit



1st step:
Fixing energy converter

The energy converter (**Pos. 26**) can be mounted at the rotating head (**Pos. 2**) or at the base frame (**Pos. 3**).



2nd step:
Controlling the East-West axis

Mount the DEGER**conecter** with the inscription 'Ost-West' (**Pos. 27**) pointing **UPWARDS** above the solar module surface.

Connect the cable of the IMO (drive motor east-west)
Blue cable connection 3
Brown cable connection 4

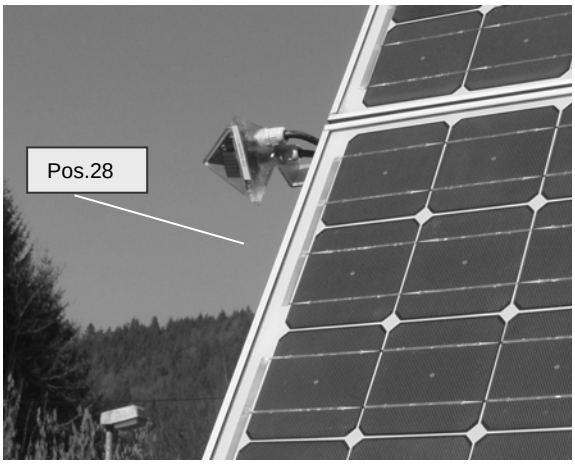
Function test:
Check if the drive rotates the module surface towards the brightest spot in the sky. If you are not sure, you can cover a sensor cell at the DEGER**conecter** with your hand – now the module surface should rotate in the direction of the non-covered sensor cell. Otherwise change connection 3 / 4

3rd step:
Controlling the elevation axis

Mount the DEGER**conecter** with the inscription 'elevation' (**Pos. 28**) **LATERALLY** at the solar module surface. (left side; seen from the front side)

Connect the cable of the EMO (drive motor for elevation)
Blue cable connection 1
Brown cable connection 2

Function test:
Check if the drive rotates the module surface towards the brightest spot in the sky. When the sky is cloudy the control will move the module surface into the horizontal. In this case, too, if you are not sure, you can cover a sensor cell at the DEGER**conecter** – then the module surface should rotate in the direction of the non-covered sensor cell. Otherwise change connection 1 / 2



Checking of the elevation- and east-west-mechanics

Extend and retract the complete way of the drive, to guarantee that the mechanics moves freely, doesn't knock agaist anyting and that the cables are long enoungh. Use a 12V or 24V batterie (for ex. suitable for a battery-driven drill) for the head of the drive.

3. Technical describtion

3.1 Functional describtion

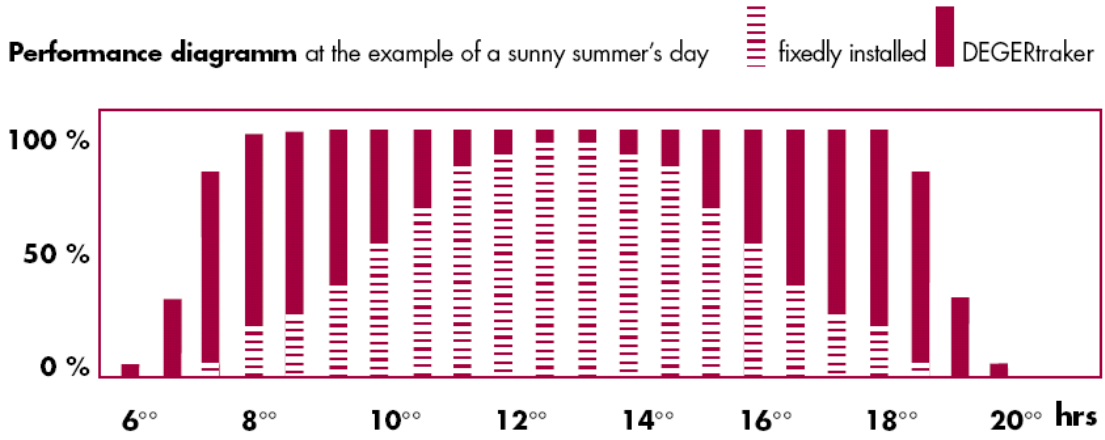
A technology to rely on.

The fact that the patent-protected control system and the utility model-protected mechanical system were awarded the inventor's prize of the federal state of Baden-Württemberg in South-Germany in 2000 shows that the DEGER**traker** meets the demands of both experts and investors. The proven static design of the DEGER**traker** is based on DIN 1055-4 (8.86) and DIN 1056 (10.84) for installation up to 8m.

Functioning

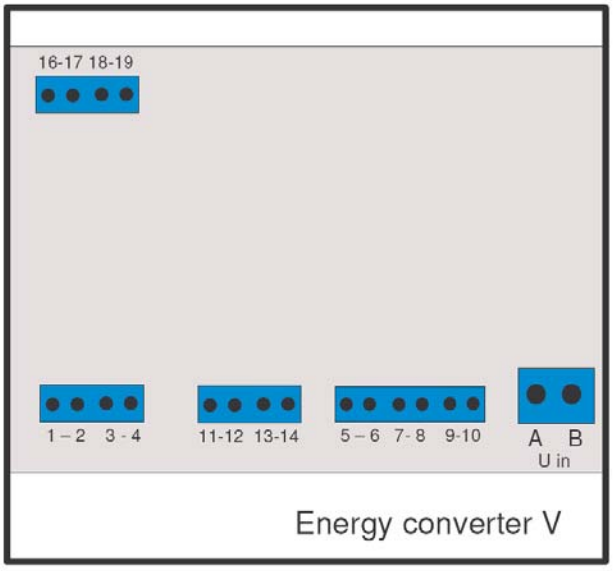
The DEGER**conecter** control unit detects the brightest spot in the sky and adjusts the module surface's position to face it. The DEGER**traker's** mechanical system allows the accurate adjustment of the module surface to the sun all year round. **This technology also works in cloudy, rainy or foggy conditions.** If, for example, a day starts off sunny with clouds moving in from the west in the afternoon, the module surface will then move back slightly towards the east. On a completely overcast day, the module surface is adjusted to a horizontal position, or to face the point of the strongest irradiation. This allows to make the most out of adverse weather conditions.

The control unit is designed to work preferably efficiently and only to do activities that cause a direct increment of the solar yield. In particular the system doesn`t move east globally at night but does this with the sunrise in the morning.



3.2 Data sheet energy converter V

Power supply of the DEGER**conecter** and the drive
- for power net feed systems of 80V...380V DC
- or 80...265V AC (Grid)
- or for self-contained supply of the drives



Pin assignment

A - B : Power supply polarity-independent
80 – 380V DC direct current or
80 - 265V AC alternating current

Attention: From a voltage of 120V and above, single-core double-insulated cables must be used!

1 - 2 : Connection for elevation motor
In case of wrong move direction – change connection 1-2

3 - 4 : Connection for east-west motor
In case of wrong move direction – change connection 3-4

Discription of further connecters

5 - 6 : Power supply to DEGERconecter elevation
5-plus-brown cable / 6-minus-white

7 - 8 : Power supply DEGERconecter east-west
7-plus-brown-cable / 8-minus-white-cable

9 - 10 : Input for self-contained supply of the tracking system with a module of 0.5-10Wp, 22-27V open circuit voltage

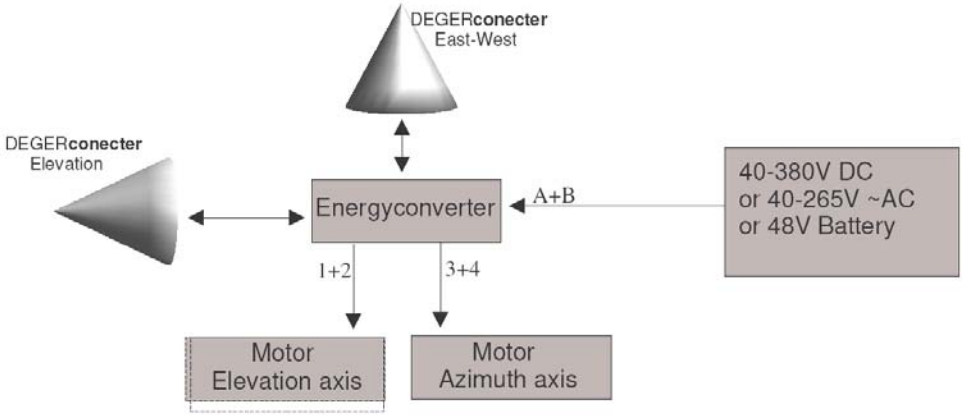
11-12: Output from DEGERconecter elevation
green cable-11 / yellow cable-12

13-14: Output fom DEGERconecter east-wset
geen cable-13 / yellow cable-14

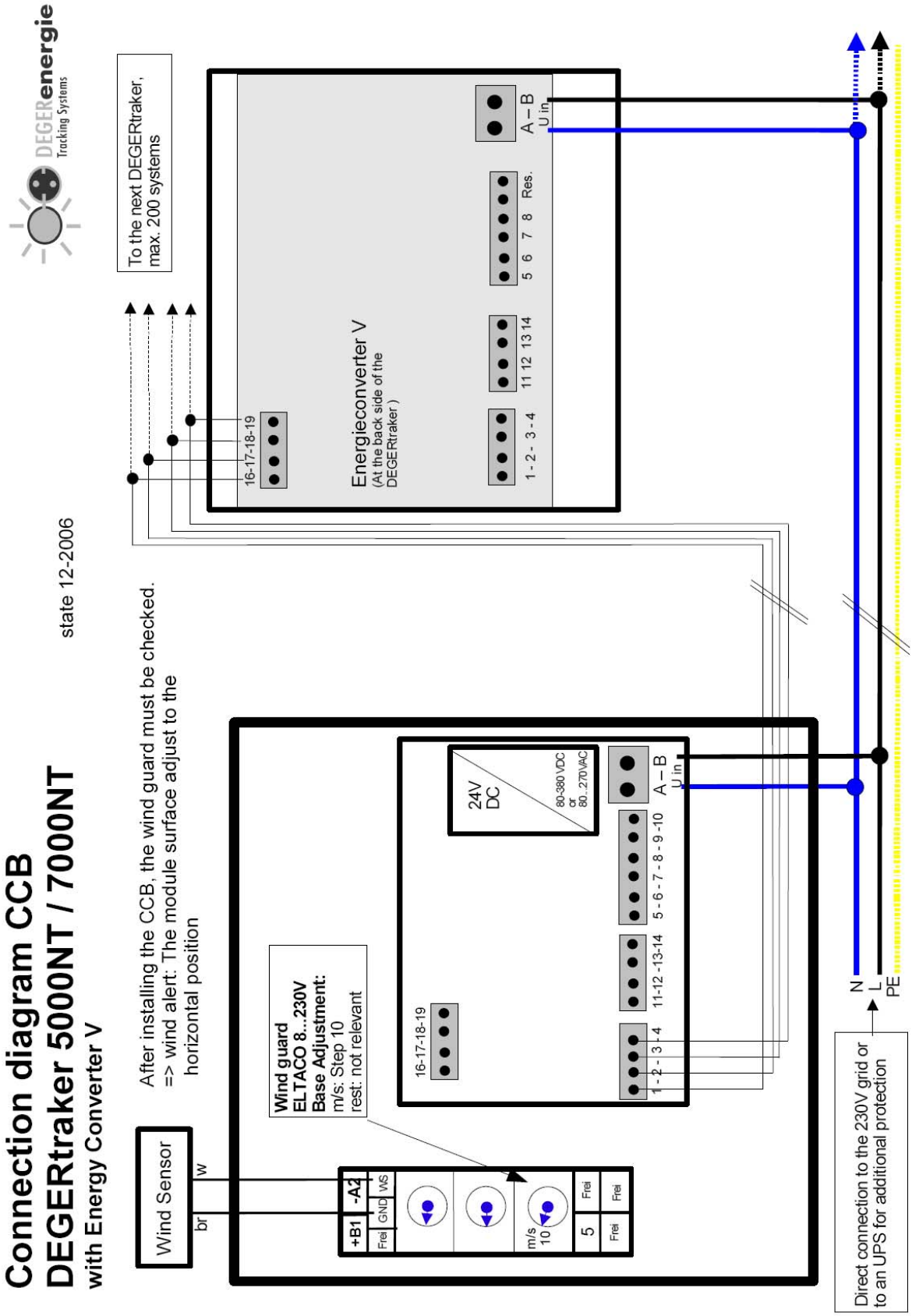
16-17: Input for selectiv switch circuit elevation axis (e.g. wind guard)

18-19: Input for selectiv switch circuit azimuth axis

The complete control unit in overview:



3.3 Connection Diagramm CCB with energy converter V



4. Certificates

4.1 Declaration of conformity

Declaration of Conformity

in accordance with EC machine directive 98/37/EG, addendum II A

for solar tracking systems

We,

DEGERenergie GmbH, 72296 Schopfloch, Germany

herewith declare that the listed products in the way we put them in circulation destined for EC member countries are fitted with CE plates in accordance with EC machine directive.

Note:
This declaration will become invalid if the product is
- modified, supplemented or changed in any kind
- and/or accessories not from DEGERenergy are used
- and in case of inappropriate assembling or installation or not intended use/improper use

without our express permission

marking of the systems:	DEGER**traker 5000NT, 7000NT**
EC-directives:	EC machine directive (98/37/EC) EC Low Voltage Directive 73/23/EEC) EC EMV directive (89/336/EWG) i.d.F. 93/31/EWG
Applied harmonised standards:	EN 60730-1:2000 EN 60730-1/A14:2005 EN 55011:1998 EN 61000-3-2:2000 EN 61000-3-3:1995 + A1:2001 EN 61000-6-2:2005 EN 50102
Applied national standards and technical specification:	VDE 0470-100,VDE 0875,E VDE 0530,DIN VDE 0470-1 DIN 42025 DIN 40050-2 DIN 1055-1 DIN 1055-4 DIN 18800

Schopfloch, 19.03.2007

DEGERenergieGmbH , Artur Deger
- General Manager -

4.2 Declaration of commitment

DEGERenergie GmbH
Steinshalde 56
72296 Schopfloch-Oberiflingen
Telephone: 07443-240 60
Fax: 07443-240 610
E-mail: info@DEGERenergie.de

DEGERtraker 7000NT

You have purchased a product that was submitted to careful examination prior to delivery. If, in spite of all our care, the system which you purchased and we delivered is defective, we will accept liability for defects to the following extent:

Liability for Defects

DEGERenergie GmbH undertakes to its contracting partner that it shall accept liability for defects as follows:
Contrary to the statutory two-year period for enforcing claims in respect of defects, the period granted for enforcing claims in respect of defects shall be extended to three years only when the start-up protocol is filled out completely and sent to DEGERenergie within 4 weeks of start up.
The compensation of exchange workings during the statutory warranty is exclusively based on the current version of the DEGERenergie time target indemnification which can be provided on demand.
This extended liability for defects shall apply only in respect of replacing the defective material, but not for any other costs, in particular the cost of labour.
In the event of any damage, DEGERenergie GmbH's contracting partner undertakes to notify said damage to DEGERenergie GmbH without delay.

Proof

DEGERenergie GmbH is only obligated to provide liability for defects to the contracting partner if the unit constituting the object of the complaint is returned to DEGERenergie GmbH together with a copy of the invoice issued to the contracting partner. The unit identification plate must be fully legible.

Conditions

The defective part is to be returned free of charge to DEGERenergie GmbH in its original packaging or, at the very least, in equivalent transportation packaging.
Insofar as the object of the contract exhibits a defect attributable to DEGERenergie GmbH, DEGERenergie GmbH shall be obligated to repair or exchange the defective part for a new part unless DEGERenergie GmbH is entitled to refuse to remedy the defect under the terms of the law. DEGERenergie GmbH's contracting partner must allow the latter a reasonable period of time in which to remedy the defect.
The repair or replacement of the defective part shall be free of charge for DEGERenergie GmbH's contracting partner.
The DEGERtraker 5000NT can be only started in combination with a suitable wind guard designed to move the solar module area into a horizontal position in the event of stormy weather. The contracting partner must guarantee that the wind guard is in place at all times and functions correctly.

Exclusion of liability

DEGERenergie GmbH shall not be liable for additional costs incurred as a result of using higher masts than the standard version of 3,3 m in total, or for damage due to incorrect operation by the contracting partner, in particular by making the module surface area too large.
The respective specifications from the data sheet must be observed. DEGERenergie GmbH cannot accept any liability damage caused by over-dimensioning the module area.
Neither can DEGERenergie GmbH accept liability for consequential damage caused by a defective tracking system.

DEGERenergie GmbH shall not be liable for:

- Defects due to improper use;
- Defects due to the insert of foreign components for example mounting profiles;
- Defects due to changes to the mechanics and/or electronics;
- Defects due to acts of God (lightning, over voltage, storm, fire, etc.);
- Defects due to a higher upright height (statics shows max. 8m permitted);
- Defects due to interventions, changes, or attempted repairs;
- Defects due to non-compliance with the instructions in the assembly and connections guide.

Our General Terms and Conditions for Deliveries and Services shall apply in all other respects, correct as of: September 2005.

5. Trouble shooting / Maintenace

5.1 Trouble Shooting

Precondition for trouble shooting:

The DEGERtraker has been assembled step by step as in the assembly instruction described

Type of error	*Test step*	*Check / Measurement*	*Result*	*Solution*
Both axles do not move	**1**	Check voltage supply in the energy converter at connection A /B	no distribution voltage >	reconnect > OK
			voltage contact >	continue with step 2
	2	Check voltage between connections 5 / 6 (EL) and 7 / 8 (AZ): Target: 20...28V	not between 20 and 28V >	continue with step 3
			voltage contact >	continue with step 4
	3	Disconnect both DEGERconecters (sensors) at the circuit board and check again	voltage contact >	change conecter > OK
			not between 20 and 28V >	change circuit board > OK
One axle does not move	**4**	Disconnect elevation drive at connection 1/2 or east-west drive at connection 3/4 and power directly from storage battery (12..24V e.g. from battery-driven drill)	drive does not run >	change drive > OK
			drive runs >	change conecter > OK
East-west drive whirrs but system does not move	**5**	Uncover and check planetary back geared motor in the aluminium housing	motor not actuated >	assemble motor correctly > OK
			motor is assembled correctly>	change geared motor > OK
Does not start reorienting itself towards the sun until after 10 am	**6**	Check end position west with compass or better with GPS Target: Rotation up to 290° north-west (east=90°, south=180°, west=270°)	Rotates too far towards north-west in the evening >	adjust limit switch > OK
			Does not rotate further than 290° towards north-west >	continue with step 7
	7	Check DEGERconecter east-west axis for correct installation	Conecter is not assembled correctly >	adjust conecter east west further to the front > OK

5.2 Maintenance

The DEGERtraker 5000NT is designed for as less as possible service- and maintenace work to do. For a safe and long-life running of the system it is necessary to do the following jobs periodically once a year:

- controll all screws and tighten them up to the torque given in the assembly instruction.

Mounting screw Dimensions	Tightening torque M_A [1)] in Nm screw strength class
M6	7,8
M8	19,1
M10	38,0
M12	66,5
M14	107,0
M16	168,0

1) M_A according to VDI-guideline 2230 (Feb. 2003) for μ_A=0,08 and μ_B=0,12

- controll all moving parts and lubricate them again if necessary. Pay special attention to the IMO.

Addapted Lubricants for DEGERtraker 5000NT:

Supplier	Product name	Applicable temperature range	
Avia	Avialith 2 EP	-30	+130
Bechen	High-Lub L 474-2	-20	+120
Bechen	Beruplex EP-O	-35	+150
Bechen	RHUS LT 2 EP	-25	+120
Castrol	Longtime PDD	-40	+140
Fuchs	Renolit Duraplex EP2	-30	+160
Rhenus	Norplex LKP2	-20	+150

Report of implementing DEGERtraker 7000NT

Operator: _____
(name, addres, Tel. of operator)

Installer/Planer: _____
(name, addres, Tel. of Installer/Planer)

Date of implementing : _____
Amount: _____ **year of construction:** _____
Serial number(s): _____

Assembley:

☐ free standing traker ☐ traker integrated in building ☐ total height _____m (top edge module surface)

☐ standard-mast (3,30m) ☐ Mast extention_____m ☐ Energy converter ☐ V ☐ II

☐ wind guard type : _____

Power supply: ☐ direct current____ V / DC ☐ alternating current___ V/AC

Control of the assembly		**O.K.**	**inplemen-ting**	**current**
reinforcement of the foundation was build in due to the plan				
hole sphere of action is free of objects				
mechanic moves freely, cables are long enough				
bore holes for dewatering of the EL-motor on the lower side				
locking fluid EL-motor (Pos.8) is applied				
dimensions of module arrangement are abode				
symetrical arrangement of the modules to the center of gravity				
lightning protection and grounding is connected				
conecter East-West axle is mounted pointed upwards above the solar module surface				
conecter elevation axle is mounted laterally at the solar module surface				
Control of the function				
East-West drive rotates towards the brightest spot (cover one sensor cell)				
Elevation drive rotates towards the brightest spot (cover one sensor cell)				
activation by use of wind guard drives traker into horizontal position				
Measured data		**reference**		
Power supply	clamp A-B		V	V
Conecters:				
Power supply to conecter elevation	clamp 5-6	20-24V	V	V
Output from conecter elevation	clamp 11-12	20-24V	V	V
Power supply to conecter east-west	clamp 7-8	20-24V	V	V
Output from conecter east-west	clamp 13-14	20-24V	V	V
Motors:				
Power supply to motor elevation	clamp 1-2	20-24V	V	V
Power supply to motor east-west	clamp 3-4	20-24V	V	V
current consumption motor elevation		0,4-1,1A	A	A
current consumption motor east-west		0,4-1,1A	A	A

Date: _____
Signatures:

_____ _____
Installer/Planer Operator

IMPORTANT INSTRUCTIONS!!

The start-up protocol should be filled out on initial operation and faxed to the company DEGERenergie within 4 weeks of start-up. Fax-No. 07451 / 5391410
The entitlement to warranty claims for material defects will be only be extended from the statutory two-year period warranty to three years if this protocol is submitted within the specified timeframe.

Fault report

To give any help in case of problems with our systems it is necessary to have this fault report on hand. Without a completely filled out fault report there can not be given any support!!
Please send this report to the following fax number: 0049-7451 / 5391410
Please give necessarily the phone number to contact you as soon as possible.
RECALL-NUMBER: _____ (obligatory given)

Type: ☐ TOPtraker ☐ DEGERtraker 300EL ☐ DEGERtraker 1000EL
☐ DEGERtraker 1200EL ☐ DEGERtraker 1600EL ☐ DEGERtraker 2500EL
☐ DEGERtraker 4000EL ☐ DEGERtraker 5000NT ☐ DEGERtraker 7000NT

Operator: _____
(name, addres, Tel. of operator)

Installer/Planer: _____
(name, addres, Tel. of Installer/Planer)

Date of implementing : _____
Quantity: _____ **year of construction:** _____
Serial number(s): _____

Assembly:

☐ free standing traker ☐ traker integrated in building ☐ total height _____m
(top edge module surface over ground)

☐ standard-mast ☐ Energy converter ☐ I ☐ II ☐ III ☐ V

☐ wind guard type : ☐ ELTAKO ☐ ELERO ☐ CCB

Power supply: ☐ direct current____ V / DC ☐ alternating current___ V/AC

Control of the assembly		**O.K.**	**inplemen-ting**	**current**
reinforcement of the foundation was build in due to the plan				
hole sphere of action is free of objects				
mechanic moves freely, cables are long enough				
bore holes for dewatering of the EL-motor on the lower side				
locking fluid EL-motor (Pos.8) is applied				
dimensions of module arrangement are abode				
symetrical arrangement of the modules to the center of gravity				
lightning protection and grounding is connected				
conecter East-West axle is mounted pointed upwards above the solar module surface				
conecter elevation axle is mounted laterally at the solar module surface				
Control of the function				
East-West drive rotates towards the brightest spot (cover one sensor cell)				
Elevation drive rotates towards the brightest spot (cover one sensor cell)				
activation by use of wind guard drives traker into horizontal position				
Measured data		**reference**		
Power supply	clamp A-B		V	V
Conecters:				
Power supply to conecter elevation	clamp 5-6	20-24V	V	V
Output from conecter elevation	clamp 11-12	20-24V	V	V
Power supply to conecter east-west	clamp 7-8	20-24V	V	V
Output from conecter east-west	clamp 13-14	20-24V	V	V
Motors:				
Power supply to motor elevation	clamp 1-2	20-24V	V	V
Power supply to motor east-west	clamp 3-4	20-24V	V	V
current consumption motor elevation		0,4-1,1A	A	A
current consumption motor east-west		0,4-1,1A	A	A

Description of problem:

_____
_____
_____
_____

Date: _____ signature: _____
Installer/Planer